18. Provide a description for predicted short-term and long-term impacts of dredging activities on water circulation, water quality, tidal wetland values, and aquatic biota.

Response:
As noted in response to Data Request 16, there is no submerged aquatic vegetation in the area proposed to be dredged by AES. Accordingly, there will be no direct impact to this resource. The lack of any indirect impacts is discussed below.

AES has proposed the option of two dredging methods for use in the Sparrows Point LNG development: mechanical dredging with a conventional clamshell bucket and mechanical dredging with an enclosed environmental bucket. Dredging utilizing an enclosed environmental bucket would be used in areas/types of material that exhibit elevated contaminant concentrations, and in accordance with permit conditions that may be applicable. No hydraulic dredging is proposed for the Project. For further information on these dredge methods see Appendix C of Resource Report 1, General Project Description.

The United States Army Corps of Engineers ("ACOE") has published results of a dredge bucket comparison study that measured turbidity levels generated by the use of both a conventional clamshell bucket and an enclosed environmental bucket, in a document entitled "Dredge Bucket Comparison Demonstration at Boston Harbor, ACOE, March 2001." The referenced document is provided as MDE Attachment 18-ALT3 (The depth averaged turbidities for the conventional and enclosed environmental buckets were 57.2 Formazin Turbidity Unit (FTU) and 12 FTU, respectively). The depth averaged total suspended solids concentrations for the conventional and enclosed environmental buckets were 210 mg/L and 50 mg/L, respectively. As seen by these results, suspended solids can be well controlled using these alternative dredge methods in circumstances where such control is deemed necessary.

AES evaluated the potential for siltation from dredging and impact on resources in the general area of the LNG Terminal. The Fort Carroll oyster reef restoration project, or Project 64, is an education-based oyster reef restoration project on upper Chesapeake Bay oysters (NOAA 2006) that is located about 1,500 feet away from the closest area proposed to be dredged (West Northwest from the approach channel). Multiple studies (Borrowman (2006), Dredge Research, Ltd. (2003), Tubman & Corson (2000) and Collins (1995)) have reported turbidity plumes from dredging activities, including dredging from clamshell, hydraulic, and hopper dredging within soft sediments are highest within the dredge site and decrease with distance away from the site. These studies furthermore determined that at a distance of about 400 m (1,200 feet) or greater away from the dredge site, turbidity levels were generally negligible and had little to no

impact on oyster bed survival and growth (Kennedy and Breisch 1981). Given that the closest point of any dredging activity to the oyster restoration site is at least 1,500 feet away from the dredging site, it is anticipated that there will be no negative impacts on the Ft. Carroll oyster restoration project. Consultation with NMFS is ongoing and AES has requested the concurrence of NMFS regarding the anticipated impacts of the dredging activity on the Fort Carroll oyster reef restoration project.

Long-term dredging impacts would be based on ongoing maintenance dredging required for the approach channel and turning basin associated with the LNG Terminal. Based on historical dredging records and bathymetric data in the vicinity of the Terminal Site, a siltation rate in the range of four inches/year can be expected. Assuming maintenance dredging is carried out after approximately two feet of siltation (as is current practice in the area), maintenance dredging is expected to be required approximately every six years. Given the total area of the access channel, the turning basin, and the marine area adjacent to the unloading pier, this would result in approximately 500,000 cubic yards ("cy") of dredged material every six years. Of course, this assumes that the siltation is evenly spread over the entire marine use areas. With regard to disposition of the dredge material, AES would coordinate with local authorities to determine if, at that time, processing through the Dredge Material Containment Facilities might be a feasible option for disposal of the maintenance dredged materials. If it is not, then AES would identify other locations of disposal available at the time such as innovative reuse or beneficial uses of the material via, as necessary, continued use of the DMRF.

Regarding impacts to water circulation, the dredging proposed by AES will have a positive impact on circulation and oxygen levels. Oxygen depletion occurs in areas where there is little or no circulation of water to replenish oxygen levels and/or where chemicals in the bottom sediments combine with the oxygen that is in the water to remove the oxygen. For example, a deep hole dug in the bottom of a lake could potentially make for an area of low oxygen. Even in a natural setting with relatively no contamination in bottom sediments, factors such as differences in temperature and salinity can prevent circulation in the water column and lead to oxygen depletion in deep water. Likewise, there are lake and harbor bottom sediments that are so polluted that oxygen from the overlying water has been taken up by the chemicals in the bottom sediments.

AES has proposed to dredge in an area offshore of the old Bethlehem Shipyard. This area has been routinely dredged by others for many years to accommodate the shipbuilding industry. The most recent dredging occurred this past winter; it was performed in a manner just like other dredging projects throughout the Port of Baltimore. AES's proposed dredging will be done in a way that connects the area offshore of the shipyard to the deeper channels of the Patapsco River and

the downstream Chesapeake Bay. Those deeper channels are about 50 feet deep. The connection will be made by widening and deepening the existing channel that leads to and from the shipyard to a uniform depth of about 45 feet so that there are no deep holes where circulation stops. Also, the dredging will be done at the mouth of the Patapsco River and Bear Creek in a location that receives the flow of those waterways. This means that AES's plan will remove barriers to water circulation in the area. AES will also remove the shallow layer of sediment contamination that has accumulated in this area over time. By both improving the circulation of water and removing the chemicals in the bottom sediments, oxygen levels are better maintained and provide a better aquatic environment.

Regarding potential impact to tidal wetland value, none are anticipated from development of the Project. Tidal wetlands occur in proximity to the Project within the Chesapeake Bay Critical Area. In response to concerns about the quality and productivity of the Chesapeake Bay, the Chesapeake Bay Critical Area Protection Program was established in 1984 with the passage of the Critical Area Act, a comprehensive resource protection program for the Bay and its tributaries. The law identified the "Critical Area" as all land within 1,000 feet of the Mean High Water Line of tidal waters or the landward edge of tidal wetlands, and all waters of and lands under, the Chesapeake Bay and its tributaries. Critical Area Land Categorization: land is categorized by its predominant use and the intensity of its development. There are three categories, which include Intensely Developed Areas (IDAs), Limited Development Areas (LDAs) and Resource Conservation Areas (RCAs). Any development or redevelopment within an IDA must reduce water quality impacts associated with stormwater runoff to a level at least 10 percent below the load generated by the same site prior to development (the "10% Rule"). LDAs are areas in which development is of a low or moderate intensity.

There are a total of 12 Critical Area crossings along the Pipeline Route, with a total of 3.0 miles (15,955 feet) crossed (see Table 3.5-1 of Resource Report 3, *Fish, Wildlife and Vegetation*). All Critical Area lands are in the southern portion of the Project Area and comprise fifteen crossings (totaling 15,772 feet) of Intensely Developed Area (IDA) lands, five (5,183 feet) crossings of Limited Development Area (LDA) lands, and no (0 feet) crossings of Resource Conservation Area (RCA) lands along the Project Route. There are a total of six access road crossings and three pipe yard crossings of Critical Areas. There are five access road crossings of IDA lands (3840 feet) and one access road crossing of LDA land (1120 feet). There are three pipeyards and the Terminal Site located in IDA lands (again, see Table 3.5-1 of Resource Report 3).

All work within tidal wetland areas will be performed consistent with Best Management Practices (see BMPs contained in Resource Report 2, and also

referenced in response to Item # 38). All wetland areas (tidal or non-tidal) will also be restored following construction. The only area of tidal wetland subject to change is the immediate waterfront area of the LNG Terminal site where existing already constructed-upon shoreline will be modified by installation of a new floodwall bulkhead. A portion of existing land area along the current shoreline (e.g. Pier 2) will also be removed to generate new water bottom land as part of the project. See also the response to Items #22 and #24 for additional information and a site plan relative to this area.